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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,938	09/11/2003	Amitabh Vyas	38190/268370	5047
826	7590	12/28/2004	EXAMINER	
ALSTON & BIRD LLP BANK OF AMERICA PLAZA 101 SOUTH TRYON STREET, SUITE 4000 CHARLOTTE, NC 28280-4000			STONER, KILEY SHAWN	
			ART UNIT	PAPER NUMBER
			1725	

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/659,938	<b>Applicant(s)</b> VYAS, AMITABH	
	<b>Examiner</b> Kiley Stoner	<b>Art Unit</b> 1725	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 November 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4,6-18,20-32 and 34-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,7-13,15-17,20-31 and 35-41 is/are rejected.
- 7) ☒ Claim(s) 4,6,14,18,29,32 and 34 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/11/03, 11/5/03, 7/23/04, 11/19/04</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

Claim 29 is objected to because of the following informalities: In line 2 "t" must be changed to --to--. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 7, 12, 15-17, 20, 25, 28-31, 35 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over TWI, Re-stir of the IDS received 11-5-03. Re-stir teaches a method of friction stir welding a workpiece, the method comprising: urging a friction stir welding pin against the workpiece; rotating the friction stir welding pin; and adjusting a rotational speed of the friction stir welding pin cyclically or with predetermined schedule and thereby friction stir welding the workpiece (pages 1-3); said adjusting step comprises cyclically adjusting the rotational speed of the pin between first and second predetermined speeds (pages 1-3). This occurs when the direction of rotation of the friction stir welding tool is changed. The speed of the probe changes from positive to negative upon the changing of direction of the probe. In addition, it is obvious that there would have to be some slowdown and acceleration

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when the probe changes direction. Re-stir teaches that the re-stir is performed at a welding speed of 1.6 mm/sec (96mm/min), using 5 revolutions per interval; 4mm/sec (240 mm/min) travel speed, using 10 revolutions per interval; and a travel speed of 3.3 mm/sec (198 mm/min) and at 10 revolutions per interval. Although the interval is not explicitly stated, it is obvious to one of ordinary skill in the art that the reversal of direction would be within the frequency of between about 0.1 Hz and 100 Hz in order to obtain the weld joints in the Figures of Re-stir.

With respect to claims 3, 17 and 31, it would have been obvious to one of ordinary skill in the art at the time the invention was made to cyclically adjust the rotational speed of the pin between the first speed of at least about 100 RPM and the second speed greater than the first speed, since it has been held that discovering an optimum value or a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The artisan would have been motivated to cyclically adjust the rotational speed of the pin between the first speed of at least about 100 RPM and the second speed greater than the first speed by the reasoned expectation of forming a symmetrical friction stir weld having the desired microstructure.

Re-stir also teaches said adjusting step comprises cyclically reversing the rotational direction of the pin (Figure 1). The apparatus of Re-Stir obviously has a controller to change the direction and speed of the probe during the Re-stir process.

Re-stir also teaches the workpiece comprising at least one of the group consisting of aluminum, aluminum alloys, titanium, titanium alloys, and steel (page 2); the pin having at least two portions, the portions defining dissimilar diameters (Figure 1).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8, 13, 21, 26-27, 36, 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over TWI, Re-stir of the IDS as applied to claims 1, 16 and 29 above, and further in view of Okamoto et al. (US-20040074944A1). Twi, Re-stir teaches all of the limitations of the claims except for said adjusting step comprises providing a varying electric current to an actuator for rotating the pin; said rotating step comprises rotating a friction stir welding pin having first and second independently rotatable portions; said adjusting step comprises adjusting a rotational speed of each portion of the friction stir welding pin in accordance with a predetermined schedule such that the first and second portions rotate at different speeds during at least a portion of said adjusting step; the pin includes first and second portions, the portions being independently rotatable; and wherein the pin includes first and second actuators for independently rotating the first and second portions of the pin, respectively.

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Okamoto et al. teaches said adjusting step comprises providing a varying electric current to an actuator for rotating the pin (paragraphs [0009], [0011], [0031] and [0039]); said rotating step comprises rotating a friction stir welding pin having first and second independently rotatable portions (paragraphs [0038], [0043] and the Figures); said adjusting step comprises adjusting a rotational speed of each portion of the friction stir welding pin in accordance with a predetermined schedule such that the first and second portions rotate at different speeds during at least a portion of said adjusting step (paragraphs [0038], [0043] and the Figures); the pin includes first and second portions, the portions being independently rotatable; and wherein the pin includes first and second actuators for independently rotating the first and second portions of the pin, respectively (paragraphs [0038], [0043] and the Figures).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the electric spindle adjustment of Okamoto et al. with the Re-stir method in order to drive the spindle at the desired rotation speed and form the desired microstructure.

Claims 9-11, 22-24 and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Re-stir as applied to claims 1, 16 and 29 above, and further in view of Stol et al. (US-20020125297A1). Twi, Re-stir teaches all of the limitations of the claims except for heating the workpiece to a preheat temperature before said urging step; and wherein said heating step comprises energizing an induction heater.

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Stol et al. teaches heating the workpiece to a preheat temperature before said urging step; and wherein said heating step comprises energizing an induction heater (paragraph [0044]).

With respect to claims 11 and 24, it would have been obvious to one of ordinary skill in the art at the time the invention was made to heat the workpieces by at least 50F to a temperature that is less than a plasticizing temperature of the workpiece, since it has been held that discovering an optimum value or a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The artisan would have been motivated to heat the workpieces by at least 50F to a temperature that is less than a plasticizing temperature of the workpiece by the reasoned expectation of increasing the travel speed of the probe.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine induction pre-heating of Stol et al. with the Re-stir method in order to maximize ductility and increase joining speed.

### ***Allowable Subject Matter***

Claims 4, 6, 14, 18, 32 and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

The prior art of record that is cited as of interest is presented on the form-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kiley Stoner whose telephone number is (571) 272-1183. The examiner can normally be reached on Monday-Thursday (7:30 a.m. to 6:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on Monday-Friday at (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**KILEY S. STONER**  
**PRIMARY EXAMINER**

*Kiley Stoner* 12/22/09